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An Integration and Evaluation Framework for ESPC Coupled Models

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LONG-TERM GOALS

A coupled earth system model with predictive skill from 1 week to 1 year.

OBJECTIVES

To establish an ESPC Coupling Testbed that allows for collaborative research into coupling technologies, and use it to prototype multi-model optimization techniques focused on computing systems with accelerator technologies. To support migration of optimization strategies from the ESPC Coupling Testbed to infrastructure packages and coupled model applications, and provide support for coupling of optimized components in the ESPC program. To extend ESPC-related computational committees to address new requirements driven by changes in computing architectures and program needs, and to initiate scientific committees.

APPROACH

Prototype the ability for models coupled through either MCT or ESMF to be coupled together in NUOPC. Use the MOAB mesh library that will be used by both MCT and ESMF as the point of linkage. This work will primarily be done by Software Development Specialist Jayesh Krishna under the supervision of the PI.

WORK COMPLETED

None. This project has just started.

RESULTS

None. This project has just started.

IMPACT/APPLICATIONS

This work will go a long way to allowing climate component models developed by several different agencies to be coupled together and have their climate and weather prediction skill quantified and

compared. The result could be a best-of-class predictive model and clear indications of where more research is needed.

RELATED PROJECTS

Accelerated Prediction of the Polar Ice and Global Ocean (PI Eric Chassignet, Florida State University) - This project will improve Arctic forecast capability by modifying component models to better utilize new computational architectures.

Navy Atmosphere-Ocean Coupled Models on Many-Core Computer Architectures (PI Lucas Wilcox, Naval Postgraduate School) - The goal of this project is threefold. The first goal is to identify the bottlenecks of the Nonhydrostatic Unified Model of the Atmosphere (NUMA) and then circumvent these bottlenecks through the use of accelerators. The second goal is to implement Earth System Modeling Framework (ESMF) interfaces for the accelerator-based computational kernels of NUMA allowing the study of coupling many-core based components. The third goal is to implement NUMA as an ESMF component allowing NUMA to be used as an atmospheric component in a coupled earth system application.